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ABSTRACT

Characteristics of colleges that are related to the achievement of undergraduates in teacher education were studied, based on study of 15 North Carolina institutions, 10 predominantly white and 5 predominantly black public universities. Student performance on the National Teacher Examinations and Scholastic Aptitude Test (SAT) scores were used as indications of achievement, which was correlated with the following college characteristics: library facilities, the age and size of the institution, curriculum, student body attributes, financial resources, and faculty characteristics. In addition, interviews were conducted in 1981 on four campuses with the chief academic officer, teacher education faculty, and students with high grade point averages. Aggregate data from the schools and interview findings indicate that faculty characteristics were the most important influence on student achievement, followed by student body attributes, appropriations directed toward faculty improvement, and curriculum design. Degrees obtained by an institution's liberal arts faculty were the most strongly related to differing achievement rates. Faculty expectations of students were related to the reputations of institutions from which faculty members earned their degrees. Prior educational background of all students on a campus appeared to be the most important student body attribute for influencing college achievement rates of students with comparable precollege learning. In addition, the average SAT score of the entire student body and the proportion of a campus's student body drawn from the top 40 percent of a high school class were highly correlated with differences in achievement. (SW)

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UNIVERSITY CHARACTERISTICS AND STUDENT ACHIEVEMENT

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National Institute of Education
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Abstract

This article explcres the characteristics of colleges and universities that are most closely related to differences in student achievement rates as measured by standardized tests. The research combines quantitative analysis with qualitative assessments derived from campus interviews with students, faculty members, and administrators.

University Characteristics and Student Achievement *

Assessing the relative importance of various university characteristics for student achievement is a complex undertaking. A multitude of factors--including library facilities, financial resources, curriculum design, student body attributes, and faculty quality--could conceivably have some effect on student learning. Yet, despite its complexity, such an assessment is crucial for those who entertain hopes of improving student achievement rates in higher education.

This article builds on the findings of an earlier study that compared achievement rates at ten predominantly white and five predominantly black public universities in North Carolina (2). The research compared the National Teacher Examinations (NTE)[1] performance of students with similar Scholastic Aptitude Test (SAT) scores who graduated from the fifteen institutions between 1973 and 1977. The earlier study found that:

1) Despite a high correlation between combined verbal and mathematics SAT scores and NTE weighted common examination scores (Pearson r=.88 for individual scores), students with the same SATs who graduated from different higher education institutions did not necessarily perform similarly on the NTE. Variation in NTE performance controlling for SAT scores was evident among traditionally white institutions

and among traditionally black institutions, as well as between traditionally white and traditionally black campuses.

2) In general, graduates of traditionally white campuses scored higher on the NTE than graduates with the same SAT scores from traditionally black campuses. This finding held for each race, with black graduates of traditionally white institutions generally receiving higher NTE scores than blacks with similar SATs from most traditionally black institutions, and white graduates of traditionally white campuses scoring higher on the NTE than whites with similar SATs from traditionally black campuses.

3) While causality can never be established indisputably, it is unlikely that most of these achievement differences were caused by differences among students not reflected in SAT scores such as motivation, socioeconomic status, or attrition. A more plausible explanation for most of the differences in achievement rates is that institutions had some effect on their students to cause these differing rates of achievement. That effect is apparently not dependent on the predominant race of the student body, since black graduates of one traditionally black institution received similar or higher NTE scores than blacks with the same SAT scores from some traditionally white campuses. The crucial distinction here appears to be

between "more effective" and "less effective" institutions, with predominantly white and predominantly black campuses represented in both categories, but with predominantly black campuses disproportionately represented in the "less effective" grouping. Identifying the institutional characteristics that help an institution become "more effective" at promoting student learning as measured by standardized tests is the purpose of this article.

Past Research

Past efforts to specify university characteristics that are most important for student achievement have produced inconclusive results. Nichols (9) studied pre- and post-college standardized test scores of 381 National Merit Scholarship finalists who graduated from 91 different colleges in 1962. The author used GRE-Verbal and GRE-Quantitative scores as the dependent variables, and he had access to SAT and National Merit Scholarship Qualifying Test (NMSQT) scores, high school rank, and mother's and father's education to use as controls. He discovered a strong correlation between pre- and post-college test scores (correlation between SAT-Verbal + Math and GRE-Verbal + Quantitative = .74), and he found that the student/faculty ratio, library books per student, average ability level of the student body, and affluence of the college were all unrelated to residual GRE scores.

Nevertheless the author concluded, apparently because the correlations between pre- and post-college scores were not perfect, that "...the college a student attends does, indeed, have an effect on his performance on an examination such as the GRE" (9, p. 52). But the author was unable to specify any college characteristic that was important for student learning.

Astin (1) examined data for 669 students who entered 38 four-year colleges in 1961. The author used the NMSQT as the major pre-college measure of achievement, but he also used a number of additional control variables including high school grades, father's educational level and occupation, and the educational and career aspirations of the students. The post-college achievement measures were the social science, humanities, and natural science area tests of the GRE. In addition, Astin used numerous measures of college characteristics including "predominantly Negro," but he discovered that controlling for student input measures washed out the partial correlation of college characteristics with post-college achievement: "...(N)o single measure of institutional quality seemed to have a consistent effect--positive or negative--on achievement in even two of the three areas" (1, p. 665).

Finally, a study carried out by researchers at the Educational Testing Service and reported in two articles (11,12) examined SAT and GRE area test scores of 6855

students who graduated from 95 colleges, mostly small, private, liberal arts institutions. As with the previous two studies, before and after measures of achievement were highly correlated; the correlation between college means on SAT-Verbal and GRE-Total was .91. Nevertheless the authors found that the colleges whose students had the same SAT means did not necessarily have similar GRE means. The authors concluded, at least for results on the GRE-Humanities area test, that "For colleges characterized by similar and relatively higher verbal input, the humanities data do suggest that proportion of faculty with doctorate, size of budget, and selectivity are related to achievement" (12, 1972, p. 158).

The data set used here has several advantages over these previous efforts.[2] First, the number of students per institution is substantially larger, with an average of 222.9 graduates per campus. The Nichols data averaged 4.2 students per campus, Astin's research relied on an average of 17.6 graduates per college, and the Educational Testing Service study used a data set with an average of 72.2 graduates per institution. If college or university characteristics affect student achievement, then the effect will be more evident with a larger sample of students from each institution.

Second, students who transferred more than one semester's credit from another school to their graduating institution were excluded from the data set for this study.

None of the previous studies made any apparent attempt to exclude transfers, yet transfer students can account for a substantial proportion of a college's graduates. The strength of a particular college reflected in an aggregate institutional measure is less likely to be apparent for transfers than for students who have been on campus for four years.

Third, previous studies that address the importance of university characteristics did not differentiate students by race, nor did predominantly black colleges constitute a substantial proportion of the institutions studied. Consequently the researchers could not analyze the achievement of blacks and whites separately, nor could they ascertain if institutional characteristics and cultures had varying effects on students of different race.

Research Procedures

The study on which this article is based produced estimates of the NTE performance of students with the same SAT scores who graduated from each of the 15 North Carolina public universities with teacher education programs (an arts academy was excluded). For example, based on the performance of students in the mid-1970s, graduates of the highest-ranking campus would be predicted to score 73 points higher on the NTE weighted common examination (scores may range from 300 to 900 points with a standard

deviation of 100) than students with the same SAT score who graduated from the lowest-ranking campus. Those institutional differences in NTE performance (the NTE residuals) become the dependent variable in the present study. What university characteristics are most important for explaining these differing rates of achievement for students of comparable pre-college learning?

To explore that question this article relies on both quantitative and qualitative data. (For the advantages of integrating multiple data sources, see reference 8). For each of the 15 campuses, aggregate quantitative data were collected on university characteristics to see which were most closely related to differences in achievement rates. For library facilities, the study used the number of books, number of periodicals, and annual book acquisition budget. As a proxy for breadth of curriculum requirements the research used the number of semester hours required for each student in general education courses. Student body attributes were represented by the average SAT score of all undergraduate students on campus, the proportion of students enrolled who graduated in the upper 40 percent of their high school class, and the percentage of an institution's applicants who were accepted for admission. To assess faculty characteristics, two measures were constructed, one based on the educational attainment of the faculty members on a campus, and the other based on the reputation of the departments from which the faculty

members earned their final degrees. (See the appendix for the computation of these indices.) For financial resources, the study relied on annual appropriations per student and the mean faculty salary by rank. Other quantitative variables examined include the age of the institution, the size of the student body, and the student-faculty ratio.

For all but the faculty and appropriations measures, the value was computed from University of North Carolina statistical abstracts (14) by taking the mean value on each measure for the five academic years in which the students graduated (1972-73 to 1976-77). The two faculty indices were computed from the faculty members listed in college catalogues for the 1974-75 academic year or the nearest available year. Per student appropriations were gathered from North Carolina budget documents back to the 1949-50 academic year, based on the argument that the effect of appropriations might not be evident in student performance until several years after the expenditure.

Recognizing that quantitative measures might not capture all important aspects of a college environment that influence student learning, interviews were conducted during the fall of 1981 on four campuses to gain further insight into the importance of non-quantitative characteristics. Interviews were conducted with the chief academic officer, four to eight faculty members closely involved with the teacher education program, and five to

eight of the best students enrolled in the teacher education program as determined by their overall grade point averages. Since interviewing enough faculty members or students to create a representative sample was not possible, these interviews should be viewed as an attempt to generate insights rather than as a survey of all faculty or student opinion on a campus.

The four campuses were selected because of their racial composition and their place on the institutional ranking of achievement rates. Two predominantly white institutions that ranked in the upper third of the achievement ranking, "Coolidge" and "Kennedy," (all institutional names are pseudonyms) were selected because of the strong performance of their graduates and because they are different types of institutions--Coolidge is a small liberal arts university of only 1600 students, Kennedy is a mid-sized regional university of about 6000 students. The other predominantly white institution selected for interviewing, "Johnson," is a small campus of 2300 students that ranked in the middle third of the achievement ranking, and the lowest of the predominantly white campuses. Interviews were also conducted at "King," the highest ranking predominantly black campus of 4800 students that placed in the middle third of the overall achievement ranking.

Findings

Quantitative findings and qualitative insights will be combined in the discussion of university characteristics and their relationship to achievement differences of students with comparable pre-college learning. After examining the bivariate relationship between each measure and differences in achievement, the measures will be combined in a multiple regression to obtain an estimate of their relative importance.

Library Facilities

As Table 1 indicates, no measure of library facilities is strongly related to achievement differences. Absence of a strong relationship is, however, more an indictment of the aggregate measure than an indication of the unimportance of books. We really need to know what kinds of books are available, and how often they were used by individual students, rather than the total number of books sitting on library shelves. Unfortunately, that information is not available.

(Table 1 about here)

Institutional Age and Size

Neither institutional age nor size is strongly related to achievement differences, with Pearson correlations of .07 and .41 respectively, and no compelling theoretical reason suggests that they should be related. Some

Table 1

Pearson Correlations Between University Characteristics and Differences in National Teacher Examinations Performance for Students of Comparable Scholastic Aptitude Test Scores
N = 15 Institutions

University Characteristic	Correlation With Achievement Differences
Library Facilities	
Number of Books	.32
Number of Periodicals	.38
Annual Book Acquisition Budget	.40
Age of Institution	.07
Size of Institution	
Headcount Enrollment	.41
Curriculum	
Number of semester hours required in general education courses	-.19
Student Body Attributes	
Average SAT score of student body	.83*
Proportion of student body drawn from top 40% of high school class	.70*
Percentage of applicants accepted for admission	-.20
Faculty Characteristics	
Index of degrees obtained by faculty	.88*
Index of departmental reputation from which faculty members obtained degrees	.57**
Student/Faculty Ratio	-.33
Financial Resources	
Per Capita Appropriations, 1969-70 through 1976-77	.14
Per Capita Appropriations, 1959-60 through 1968-69	.33
Per Capita Appropriations, 1949-50 through 1958-59	.44
Faculty Salaries	.52**

*$p < .01$

**$p < .05$

educators argue that students are forced to take a broader range of courses at smaller institutions because of restricted course offerings, and therefore are likely to perform better on wide-ranging tests such as the NTE common examination. But curriculum requirements and student advising are probably more important and more direct reflections of breadth than institutional size.

Curriculum

Since the NTE common examination measures achievement in the basic liberal arts areas of humanities, mathematics, and natural and social science (10), perhaps the number of courses taken in these areas, or the "time on task," is related to differences in achievement rates. Quantitative findings in Table 1 offer little support for this proposition.

Nevertheless, the interviews suggest that this factor is of at least secondary importance. Coolidge, the highest ranking campus in this study, has a strong emphasis on a broad liberal arts background which leads to two distinctive requirements that could affect NTE performance. First, all students, regardless of major, are required to enroll in a two-year humanities course, a multidisciplinary history of western civilization. Second, no prospective teacher may major in education. Each student in teacher education must complete the requirements for a regular major as well as the courses required for teacher certification; consequently most of these students stay one

and usually two semesters beyond the normal four years to complete their bachelors degree. On none of the other fourteen campuses is a prospective teacher required to complete what is in effect a double major in education and a regular academic discipline.

Some campuses encourage curriculum breadth by advising students into particular courses. The director of the teacher education program at King, the highest-ranking black campus in this study, pointed out that students were advised to enroll in courses covering material tested by the NTE; students would be encouraged, for example, to take art history rather than studio art. Another potentially helpful device used at King is a non-credit NTE review course covering both substantive knowledge and test-taking skills.

Student Body Attributes

Quantitative data support the importance of particular student body attributes for explaining differing rates of achievement. Prior educational background of all students on a campus appears to be the most important student body attribute for influencing college achievement rates of students with comparable pre-college learning. While the percentage of applicants accepted for admission is weakly related to achievement differences, the average SAT score of the entire student body on a campus and the proportion of a campus's student body drawn from the top 40 percent of a high school class are both highly correlated with

differences in achievement. We could reasonably conclude that the educational background of students contributes to an atmosphere that is more or less conducive to college learning.

Campus interviews support this interpretation. Comments from predominantly white Johnson and predominantly black King (both placed in the middle third of the institutional achievement ranking) indicate a lack of peer pressure for high achievement. "There's not the competitive edge, not the motivation, not the pressure here that there is at (a major research institution)," said one administrator at the predominantly white school. Students at that institution described an atmosphere where, despite exceptions in specific majors such as special education and mathematics, the general peer approach to academics was apathetic rather than competitive or supportive. Students and professors at the predominantly black university echoed those sentiments. "To excell you have to develop a thick skin," one student complained. "You're put down (by peers) for doing well." Another student claimed that she "would work extra, extra hard if I were at (a major research institution)," leaving the clear implication that such an effort was not required on her campus.

On the other hand, students at the two high-ranking predominantly white institutions described an atmosphere that was neither apathetic nor extremely competitive, but more supportive of academic achievement, like "a big

family." A student at Coolidge described her peers as "very motivated and serious;" a faculty member commented that she "never has problems with students not doing their work."

The student bodies on these two campuses are not drawn from a privileged elite--the average combined verbal and mathematics SAT score of the student body for the graduating classes of 1973 through 1977 was 971 at Coolidge and 896 at Kennedy. Apparently the educational background of these students, while not extremely strong, was sufficient to foster an atmosphere conducive to high achievement. Perhaps that background helps to create friendly if not extreme competition that motivates students. A strong educational background may also reinforce high expectations of faculty members; students unable or unwilling to meet a faculty's expectations will cause those expectations to fall.

Faculty Characteristics

Quantitative measures of faculty characteristics are strongly related to differences in achievement rates. Of all the quantitative measures examined in this study, the index summarizing degrees obtained by an institution's liberal arts faculty is the most strongly related to differing achievement rates, with a correlation of .88. The six campuses with lowest rates of achievement had, during the mid-1970s, liberal arts faculties where less than half of the members had earned a Ph.D. The highest

ranking campuses offered teacher education candidates a liberal arts faculty where only isolated members lacked the appropriate terminal degree.

The doctorate or other terminal degree is probably not so important itself, but rather stands as a surrogate for some other aspect of faculty or institutional quality. To explore that aspect further this study examined the reputations of the institutions from which faculty members earned their degrees, based on the 1970 Roose-Anderson ranking of graduate departments. That index of degree quality, computed by placing each graduating institution into one of four categories (see the appendix), correlated with achievement differences at .57. We might expect that correlation to be higher if a ranking provided greater discrimination among the numerous departments in any one discipline.

The student/faculty ratio is weakly correlated with differences in student achievement, probably because of lack of variation among the 15 campuses--the lowest ratio is 14.5 and the highest is 16.1.

Interviews supported the quantitative indication that faculty quality is important for achievement, although the precise link between faculty quality and student achievement is not clear. Presumably a faculty's emphasis on teaching would be important, but little differentiation appeared between higher and lower ranking institutions on teaching emphasis. Faculty members at each of the four

institutions where interviews were conducted viewed their roles more as "teachers" than as "researchers" or "scholars," and students at each of those institutions viewed their professors, with the few inevitable exceptions, as dedicated and concerned individuals who took their teaching responsibilities seriously.

Differentiation was evident, however, between higher and lower ranking institutions on the expectations faculty members placed on students. The students at the higher ranking campuses more often commented about faculty members "pushing" them to the limits of their ability. On the other hand, a student at one of the lower-ranking campuses described an atmosphere where professors established a minimum level of competence expected from every student in a class, but offered few incentives to exceed that minimum level to truly test the limits of the students' abilities.

Externally-imposed standards can apparently increase faculty expectations of student performance. For example, North Carolina is in the process of raising the minimum NTE score required for teacher certification. Faculty members at two campuses in the middle third of the achievement ranking mentioned that increasing requirement as an important factor in improving faculty expectations. A predominantly white campus faculty member observed about the increasing NTE requirement, "Faculty expectations are higher...We feel pressure for students to perform." A predominantly black campus faculty member commented, "We

realized that being 'nice' wasn't really nice any more. I wonder where we'd be if we didn't have the NTE."

Financial Resources

Per student appropriations during the 1970s are weakly related to achievement differences of students who graduated between 1973 and 1977, with a correlation of .14. But the correlation increases to .33 between achievement differences during the mid-1970s and appropriations during the 1960s, and to .44 for appropriations during the 1950s.

Examination of the data for specific campuses reveals an anomaly consistent with this pattern. From 1963, when Coolidge joined the public state institutions, throughout the remainder of the decade, the per student appropriations for that campus were substantially higher than other public campuses of similar scope. From 1964 through 1969 the campus ranked no lower than fourth among the fifteen institutions in per student appropriations, usually surpassed only by doctoral-granting institutions with expensive graduate and professional programs. According to administrators interviewed at Coolidge, North Carolina's political leaders made a conscious attempt during the 1960s to create an academically-strong public liberal arts institution, and appropriated funds accordingly. The campus instituted a ten rather than nine month contract for faculty members, and used its additional funds to increase faculty salaries proportionately. "The state gave us the

money to be more competitive in the employment of faculty," one administrator said. "We would not have had the same quality of faculty without the extra money to spend."

These results indicate that aggregate appropriations have little direct effect on student achievement. The experience of Coolidge and the findings for faculty characteristics, however, suggest that appropriations can indirectly affect achievement over the long run if money is channeled into recruiting and maintaining a strong faculty.

Variation by Race

One of the purposes of this study was discovering university characteristics that might be different for the achievement of disadvantaged black students. For example, some educators argue that the culturally homogeneous and supportive atmosphere provided on predominantly black campuses is more conducive to learning for some black students than is the more competitive atmosphere on a predominantly white campus. But this study was unable to uncover any university characteristic that was more important for students of one race than another. Quantitative characteristics that are highly correlated with the achievement differences among whites are highly correlated with achievement differences among blacks as well. Interview responses about the relative importance of various university characteristics for student achievement varied little from predominantly white to predominantly black campuses.

Interviews on the predominantly black campus produced suggestions that black students might feel more comfortable in a predominantly black environment, but the feeling of comfort might be translated into lower rather than higher student achievement. That may not be the dominant view on most black campuses, but a clear consensus was evident among those interviewed at this one institution. One white faculty member said, "I don't think the black culture is helpful for achievement. It may be helpful for social support, but it's a detriment for achievement in many cases." A black administrator on that campus agreed. "A culturally homogeneous environment can hurt as much as it can help. If students are in a milieu where they aren't challenged, then poor performance is the result."

The second portion of that administrator's comment is crucial. Cultural homogeneity, in and of itself, is probably irrelevant for student achievement. The key is the other aspects of a college environment that challenge or fail to challenge students. That environment could conceivably be created on a homogeneous or heterogeneous campus.

Relative Importance of Various University Characteristics for Student Achievement

The foregoing discussion suggests that curriculum design, student body attributes, faculty characteristics, and appropriations directed toward faculty improvement are all important to some degree for explaining differences in

achievement rates. Disentangling the independent influence of each factor is as complex as determining what proportion of a student's learning in a particular classroom is due to the professor's lectures and what proportion is derived from students' comments. In the quantitative analysis, multicollinearity among the independent variables complicates the interpretation and obscures the influence of certain factors in a multiple regression.

To reduce multicollinearity, the strongest predictive variable was selected from each set of university characteristics, determined by regressing institutional achievement differences separately on each set. As a result of this procedure, the number of books was selected from the three measures of library facilities, the average SAT score of the student body was picked from the three student body attributes, the index of degrees obtained by an institution's faculty members was chosen from the three faculty characteristics, and the average faculty salary was selected from the four measures of financial resources.

Selecting the strongest variable from each set of university characteristics reduces but does not eliminate the multicollinearity; the Pearson correlation between the index of faculty degrees and the average SAT score of the student body, for example, is .94. Table 2 presents the results of three regressions with institutional differences in NTE achievement rates as the dependent variable and different combinations of institutional characteristics as

Table 2

Multiple Regression Results for
University Characteristics and Institutional NTE Achievement
Differences for Students of Comparable SAT Scores
N = 15 Institutions

#1 NTE Ach. Diff. = $a + b_1X_1 + \ldots b_6X_6$

	b	Std. Error	Signif. Level*
a	-139.73	39.70	.007
X_1 Fac. Degree Index	73.68	20.94	.008
X_2 Genl. Ed. Hours	.35	.30	.273
X_3 Ave. Fac. Salary	-5.27	4.56	.281
X_4 Log Age**	-4.72	7.90	.566
X_5 Log Lib. Books	.28	3.54	.939
X_6 Log Size**	.37	6.18	.953

N = 15
R^2 = .88

#2 NTE Ach. Diff. = $a + b_1X_1 + \ldots b_6X_6$

	b	Std. Error	Signif. Level
a	-94.86	43.31	.060
X_1 SAT Average	.13	.05	.030
X_2 Genl. Ed. Hours	.22	.34	.540
X_3 Ave. Fac. Salary	.55	4.14	.898
X_4 Log Age	-14.10	7.54	.099
X_5 Log Lib. Books	1.53	4.04	.715
X_6 Log Size	-.55	7.45	.943

N = 15
R^2 = .83

#3 NTE Ach. Diff. = $a + b_1X_1 + \ldots b_7X_7$

	b	Std. Error	Signif. Level
a	-131.23	44.76	.022
X_1 Fac. Degree Index	60.51	36.16	.138
X_2 SAT Average	.03	.07	.660
X_3 Genl. Ed. Hours	.35	.32	.304
X_4 Ave. Fac. Salary	-4.79	4.91	.362
X_5 Log Age	-5.56	8.51	.535
X_6 Log Lib. Books	.23	3.74	.954
X_7 Log Size	-.41	6.73	.954

N = 15
R^2 = .88

*Using t-values derived from the estimate and standard error.

**Natural logarithm taken to modify the distorting influence of large size, old age, and large library of a major research institution.

NOTE: Data were missing for the number of general education hours at one predominantly white university. Rather than throwing out the entire case, the mean number of general education hours for the other fourteen institutions was used for that campus. The same procedure was followed for one predominantly black campus where salary data were unavailable.

independent variables. The first equation, including the strongest variables from each set except for SAT scores, demonstrates the explanatory power of the faculty degree index; the second equation eliminates only the degree index and shows the power of the average SAT score. The third equation, with all seven variables included, indicates that the coefficient for the faculty quality index holds at roughly the same level as in the first equation (although with a higher standard error because of the multicollinearity), while the influence of SAT average is greatly reduced. The influence of SAT average is obscured by the multicollinearity with the faculty quality index, which is apparently the more influential of the two variables.

Administrators, faculty members, and students interviewed on the four campuses support the findings of the quantitative analysis indicating that faculty quality is the single most important university characteristic affecting student achievement. This belief is consistent with the perceptions of students reported in other studies (7, p. 258) who believed that the faculty was more important than peer influences for student learning in college.

The finding is also consistent with a pattern first identified in the Coleman Report. That study indicated that student body attributes were more important than teacher characteristics for explaining differences in

elementary and secondary school achievement. But the Report also noted that "the effect of teachers' characteristics shows a sharp increase over the years of school" (5, p. 317). Teacher characteristics had a low relation to achievement at grades one and three, but increased in grades six and nine, and were highest at grade twelve. The findings of the present study suggest that the pattern continues so that, in higher education, faculty characteristics surpass student body attributes in their relative importance for student achievement.

Conclusion

The aggregate institutional measures explored in this study suggest the importance of various university charactertistics for student achievement. More definitive conclusions could be obtained from development of an individual-level data set, where we would know, for example, the degrees obtained by professors who actually taught a particular student, rather than the average attainment of the entire liberal arts faculty. Such a data set would be expensive and difficult to develop, but individual level data can be invaluable for specifying more precisely the relationships suggested by aggregate measures.

This analysis based on aggregate measures and campus interviews indicates that faculty characteristics are the

most important influence on student achievement, followed by a second tier comprised of student body attributes, appropriations directed toward faculty improvement, and curriculum design. Conceivably all of these factors combine with institutional history and tradition to create a general atmosphere of expectation that is the crucial determinant of student achievement. That atmosphere is directly affected by the expectations of faculty members for their own and their students' work, the ability and willingness of the students to respond to those expectations, and the support of the administration and governing board for academic quality. The atmosphere of expectation then becomes an important dynamic component of an institution, affected by, as well as affecting, the attitudes of future students and faculty members. Based on this analysis, creating and fostering an atmosphere of high expectation is a crucial goal for any institution aspiring to higher rates of student achievement.

Appendix

Since this study focuses on university characteristics that are related to the achievement of undergraduate students in teacher education, the faculty indices were based on and restricted to liberal arts faculty members who were most likely to teach these students. Faculty members with degrees in professional areas other than education, such as engineering, journalism, law, and medicine, were therefore excluded from the analysis. For this study, "liberal arts" is defined to include all disciplines in the natural and social sciences, humanities, mathematics, and education.

Computation of the index of faculty educational attainment was based on the highest degree obtained by each liberal arts faculty member as reported in the 1974-75 college catalogue (or the nearest available year). Four points were assigned to each faculty member who had earned a Ph.D., three points were given for an Ed.D., two points were assigned for an M.A., M.S., or other comparable degree, and one point was given for a B.A., B.S., or other comparable degree. The educational attainment index was then obtained by computing the mean value on this measure for each campus.

Computation of the reputations of departments from which faculty members earned their degrees was taken from the 1970 American Council on Education ranking of graduate

departments by Roose and Anderson (13). That ranking, conducted during 1969, relied on a survey of 60,028 faculty members at 303 United States colleges and universities. The survey asked respondents to evaluate the quality of graduate faculty at the various departments in their discipline. After weighting the results to reflect the opinion of all American college faculty members, the publication placed the ranked departments into one of three tiers. This study assigned a value of three if the department from which a faculty member earned his or her final degree was included in the top tier (3.0 to 5.0 on the Roose and Anderson scale), a two if the department was ranked in the second tier (2.0 to 2.9), a one if the department was in the lowest tier (1.0 to 1.9), and a zero if the department was unranked. The faculty reputation index was then obtained by computing the mean on this measure for each campus.

Data were listed as "missing" if the discipline was not included in the survey. The only exception to this rule was the field of education. Rather than eliminating entirely these faculty members who are so important for students enrolled in teacher education programs, this study used a separate ranking of education departments published in Change magazine (3). Since only the top twelve education departments were ranked, a value of three was assigned for graduates of the top departments to be consistent with the coding for the ACE survey, and a value

of zero was assigned if the department was unranked. For a campus with a disproportionate number of faculty members with degrees in education, the procedure reduces somewhat that campus's score on this index.

Footnotes

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[1]The NTE, taken by many prospective teachers in the United States, consists of a common section taken by all teaching candidates, and a teaching area examination in the student's speciality. The common examination used in this study is designed to assess college achievement in professional educaticn, English expression, science, mathematics, social studies, literature, and fine arts (10). Consequently knowledge necessary to perform well on the NTE common examination would presumably come from courses throughout a college curriculum, rather than from education courses alone.

[2]Two other studies (4,6) compare student achievement between predominantly black and predominantly white campuses, but neither attempts to identify university characteristics that are related to student achievement

rates.

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